The present invention, as recited in independent claim 26, is directed to a process for preparing an alginate gel or low-methoxy pectate gel. The process comprises:

step 1) mixing water and a dispersion of alginate or low-methoxy pectate in an in-line dynamic mixer thereby producing an aqueous alginate sol or an aqueous low-methoxy pectate sol, then

step 2) generating free gelling ions in the aqueous alginate sol or the aqueous low-methoxy pectate sol in the in-line dynamic mixer either a) by including in the water or in the dispersion of alginate or low-methoxy pectate a salt providing gelling ions when dissolved which is insoluble at neutral pH but soluble at acid pHs and by feeding an acid to the sol as an aqueous solution or as a dispersion or b) by feeding a dispersion of a low-solubility salt providing gelling ions to the sol, and

step 3) allowing the aqueous alginate sol or the aqueous low-methoxy pectate sol to gel after the aqueous alginate sol or the aqueous low-methoxy pectate sol has left the in-line dynamic mixer.

Wood does not disclose, teach or suggest the present invention. Wood does not disclose, teach or suggest a process, which includes the step of mixing water and a dispersion of alginate or low-methoxy pectate in an in-line dynamic mixer thereby producing an aqueous alginate sol or an aqueous low-methoxy pectate sol, and which further includes the step of generating free gelling ions in the aqueous alginate sol or the aqueous low-methoxy pectate sol in the in-line dynamic mixer, as

recited in claim 26. Wood does not disclose, in Examples 1-3 or elsewhere, the continuous in-line production of sol.

An important feature of the applicant's invention is that the sol is produced in-line, i.e., continuously, by mixing water and a dispersion of alginate or low-methoxy pectate in an in-line dynamic mixer. See, for example, pages 3 and 4 of the present specification.

The Examiner has stated, in paragraph 7 of the pending Office Action, that "Wood clearly discloses that the sol is prepared by mixing water with the gellable component in a process which is continuous (Exs. 1-3 of Wood)."

Applicant respectfully disagrees with this statement as it relates to the present claims, for example, claim 26 which includes producing a sol in an in-line dynamic mixer.

The only mention of the preparation of the sol in Example 1 of Wood is as follows:

> "*A sodium alginate sol incorporating flavouring and colouring agents was prepared from the following ingredients:*

Sodium alginate	*0.5 gm*
Sugar	*1.0 gm*
Orange flavouring and colouring agents	*0.2 gm*
Water	*50 ml"*

There is no further disclosure in Example 1 of the method of preparation of the sol.

The quantities given above clearly indicate that Wood used a batch process and not a continuous process and not an in-line dynamic mixer to produce the sol. A continuous process for producing a sol would require the relative quantities of the

ingredients to be specified in terms of flowrates, for example gm/hr or ml/hr. The specification of finite quantities of ingredients by Wood in Example 1 must result in the preparation of a single batch of a finite quantity of sol, in this case approximately 50 ml of sol.

Example 2 of Wood merely states that "50 ml of a flavoured sodium alginate sol were prepared as described in Example 1." There is no further disclosure about the preparation of the sol. Thus, Example 2 of Wood reinforces the fact that Wood is disclosing the production of a batch of sol (in this case 50 ml) as opposed to the continuous production of sol.

Example 3 of Wood describes the preparation of the sol as follows:

> "*A sodium alginate sol incorporating flavouring and colouring was then prepared from the following ingredients:*

Sodium alginate	*150 gm*
Mandarin orange flavouring agent	*10 gm*
Beta-carotene	*1.0 gm*
Water	*4.5 litres"*

There is no further disclosure in Example 3 about the production of the sol.

As with Example 1, the relative quantities in Example 3 of Wood describe the production of a batch of sol (in this case 4.5 litres) and not a continuous process, which would involve relative flowrates. Thus, Example 3 of Wood, like the other Examples of Wood, does not disclose, and does not even suggest, a sol that is produced continuously by mixing water and a dispersion of alginate or low-methoxy pectate in an in-line

dynamic mixer. Wood does not disclose or even suggest a process for making an aqueous alginate sol or an aqueous low-methoxy sol in an in-line dynamic mixer, as recited in the present process claims, such as claim 26.

Since Wood does not disclose, in Examples 1 to 3 or elsewhere, an important feature of applicant's invention recited in the present claims, applicant submits that the present process claims are clearly novel over Wood.

In view of the above, applicant submits that the claim 26 is not anticipated by Wood under 35 USC 102(b). Applicant further submits that the dependent process claims, for example, claims 27 to 28, 33 to 39, 41 and 42, are not anticipated by Wood under 35 USC 102(b) at least by virtue of their dependence on claim 26.

CLAIMS 48 AND 49 ARE PATENTABLE OVER WOOD

Claims 48 and 49 have been rejected under 35 USC 103(a) as being unpatentable over Wood. For the following reasons, applicant traverses this rejection.

The present invention, as recited in independent claim 48, is directed to a system comprising an in-line dynamic mixer with feed points through which a) a dispersion of alginate or low-methoxy pectate, b) water and c) a source of gelling ions can be separately fed to the mixer, feed points a) and b) being spaced sufficiently up-stream of feed point c) such that in use the alginate or low-methoxy pectate forms an aqueous sol or a low-methoxy pectate sol before alginate or low-methoxy pectate comes into contact with the gelling ions, and a receptacle to receive the aqueous alginate sol or the low-methoxy pectate sol, the

receptacle being such that the aqueous alginate sol or the low-methoxy pectate sol is maintained quiescently to produce an alginate gel or low-methoxy pectate gel.

It is a particularly advantageous aspect of the present invention that the sol does not need to be prepared in advance. The sol is produced in-line, i.e. continuously, in an in-line dynamic mixer.

Prior to the applicant's invention, sols were pre-prepared and then had to be stored before use. That leads to problems, for example, waste due to preparation of too much sol and difficulties cleaning vessels in which the sol is stored. See page 3, line 20 to page 4, line 9 of the present specification.

The teaching in Wood is consistent with the state of the art described above. Wood clearly describes the preparation of batches of sol, as discussed above. Moreover, Example 3 of Wood states that the alginate sol after being prepared, "was charged into one of a pair of reservoirs feeding a continuous in-line mixer ..." [emphasis added]. Thus, Example 3 of Wood makes it clear that a batch of sol is prepared which is then placed in a reservoir from which it is fed to a continuous in-line mixer (in which the pre-prepared sol is mixed with pre-prepared agar gel cubes).

Wood does not disclose or suggest that the sol is produced in an in-line dynamic mixer. Instead, Wood discloses that the sol is prepared in batches, which are then stored in the reservoir for feeding to the next part of the process. It is that batch preparation and subsequent storage of the sol that is avoided by the present invention, for example as explained at page 3 line 20 to page 4 line 9 of the present specification.

The present invention takes alginate or low-methoxy pectate and water and mixes them in an in-line dynamic mixer to continuously produce sol.

The in-line mixer mentioned in Wood performs a different function relative to the dynamic in-line mixer in the present invention. The in-line mixer in Wood is used to mix pre-prepared sol with a source of gelling ions in the form of agar gel cubes. In Wood, the sol is first made up as a batch and then charged into a reservoir for feeding to the in-line mixer. The sol is therefore not produced in an in-line dynamic mixer and there is no teaching or suggestion in Wood to provide any basis to one of ordinary skill in the art that the sol could be prepared in an in-line dynamic mixer. Moreover, it is noted at page 10, line 18 of the present specification that the sol is made more quickly at high shear rates, while it is clear from page 2 lines 3-5 of the present specification that it has previously been thought that shear should be avoided when generating free gelling ions.

A system including one dynamic in-line mixer to perform the combination of the steps of preparing the sol and generating the free gelling ions, as in the present system claims, would therefore be counter-intuitive to the person of ordinary skill in the art.

Moreover, the mere fact that Wood uses an in-line mixer for a different purpose/function in a later part of the process would not even suggest to one of ordinary skill in the art that an in-line dynamic mixer could be used for the preparation of the sol, as in the present claims.

It is surprising that the sol can be generated in an in-line dynamic mixer and even more so that the sol can be generated in the same in-line dynamic mixer as the free gelling ions. In order to create good quality gels, it has previously been thought necessary to avoid shear where possible. See the present specification at page 2, lines 3-5. Thus, the use of in-line dynamic mixers, which create shear, would typically be kept to a minimum. Whilst Wood suggests the use of an in-line mixer to mix agar gel cubes and a pre-prepared sol (Example 3), it is surprising that the extra shear resulting from having a mixer sufficiently large to also form the sol does need lead to an unacceptable reduction in the quality of the gel formed.

Wood does not disclose, teach or suggest the present invention. Wood does not disclose, teach or suggest a system comprising an in-line dynamic mixer with feed points through which a) a dispersion of alginate or low-methoxy pectate, b) water and c) a source of gelling ions can be separately fed to the mixer. As stated above, it is a particularly advantageous aspect of the present invention that the sol does not need to be prepared in advance. In the present invention, the sol is produced in-line, i.e. continuously. Wood does not disclose, in Examples 1-3 or elsewhere, a system for the production of sol in an in-line dynamic mixer. The teaching of Wood that particles based on a second gelling agent could be formed and dispersed in a pre-prepared alginate or low-methoxy pectate sol using an in-line mixer would not even suggest to the person of ordinary skill in the art that an in-line dynamic mixer could be used to combine an alginate or low-methoxy dispersion with water to form

an aqueous alginate sol or aqueous low-methoxy pectate sol, as in the present system claims 48 and 49.

The systems and processes of the present claims are entirely different and distinct from those of Wood so that there is no reason or basis for the person of ordinary skill in the art to modify and extend the deficient teachings of Wood to construct the systems or practice the processes of the present claims and obtain the surprising benefits, e.g., the production of high quality sols in a dynamic in-line mixer and the other advantages resulting therefrom, achieved by applicant. Indeed, Wood specifically teaches away from the present invention by disclosing pre-preparing a sol prior to introducing the pre-prepared sol into an in-line mixer and generating gelling ions in the pre-prepared sol in a step that does not also include the production of the sol.

In view of the above, applicant submits that claim 48 is patentable over Wood under 35 USC 103(a). Applicant further submits that claim 49 is patentable over Wood under 35 USC 103(a) at least by virtue of its dependence on claim 48.

CLAIMS 29-32 ARE PATENTABLE OVER WOOD AND NUSSINOVITCH *ET AL.*

Claims 29-32 have been rejected as being unpatentable under 35 USC 103(a) over Wood and Nussinovitch *et al.* (US 6299915). For the following reasons, applicant traverses this rejection.

The present invention as set forth in claims 29-32, which are dependent directly or indirectly on claim 26, is directed towards a process which includes a step of mixing water and a dispersion of alginate or low-methoxy pectate in an in-line dynamic mixer thereby producing an aqueous alginate sol or an

aqueous low-methoxy pectate sol, in which a dispersant is used to prepare the dispersion of the alginate or low-methoxy pectate. The dispersant is an anhydrous liquid dispersant which disperses or dissolves in water, and further includes the step of generating free gelling ions in the aqueous alginate sol or the aqueous low-methoxy pectate sol in the in-line dynamic mixer.

As stated above, it is a particularly advantageous aspect of the present invention that the sol does not need to be prepared in advance. The sol is produced in-line, i.e. continuously, in an in-line dynamic mixer.

As noted above, Wood does not disclose, teach or suggest such a process, which includes the step of mixing water and a dispersion of alginate or low-methoxy pectate in an in-line dynamic mixer thereby producing an aqueous alginate sol or an aqueous low-methoxy pectate sol, and further includes the step of generating free gelling ions in the aqueous alginate sol or the aqueous low-methoxy pectate sol in the in-line dynamic mixer, as recited in claims 26 and 29-32. Wood does not disclose or even suggest, in Examples 1-3 or elsewhere, the production of sol in an in-line dynamic mixer.

Nussinovitch *et al.* also does not disclose, teach or suggest such a process, which includes the step of mixing water and a dispersion of alginate or low-methoxy pectate in an in-line dynamic mixer thereby producing an aqueous alginate sol or an aqueous low-methoxy pectate sol, and further includes the step of generating free gelling ions in the aqueous alginate sol or the aqueous low-methoxy pectate sol in the in-line dynamic mixer, as recited in claims 26 and 29-32.

Neither Nussinovitch *et al.* nor Wood discloses, teaches or even suggests an important feature of the present invention, namely that the production of the sol and the generation of the free gelling ions occur in the same in-line dynamic mixer. Thus, Nussinovitch *et al.* fails to supply the substantial deficiencies apparent in the teachings of Wood with regard to the present claims. Therefore, the combination of Nussinovitch *et al.* and Wood does not render the present invention obvious.

In view of the above, applicant submits that the present claims, for example, claims 29-32, are unobvious from and patentable over Wood and Nussinovitch *et al.* under 35 USC 103(a).

CLAIMS 40 AND 43-47 ARE PATENTABLE OVER WOOD, DUGGER *ET AL.* AND MANN

Claims 40 and 43-47 have been rejected as being unpatentable under 35 USC 103(a) over Wood and Dugger *et al.* (WO 98/47392) and Mann (US 5,718,894). For the following reasons, applicant traverses this rejection.

In claim 40, which is indirectly dependent on claim 26, the present invention is directed towards a process which includes a step of mixing water and a dispersion of alginate or low-methoxy pectate in an in-line dynamic mixer thereby producing an aqueous alginate sol or an aqueous low-methoxy pectate sol, and in which anaerobic bacteria are introduced into the in-line dynamic mixer by incorporation into the water, and further includes the step of generating free gelling ions in the aqueous alginate sol or the aqueous low-methoxy pectate sol in the in-line dynamic mixer.

In claim 43, which is indirectly dependent on claim 26, the present invention is directed towards a process in which the product of a process including a step of mixing water and a dispersion of alginate or low-methoxy pectate in an in-line dynamic mixer thereby producing an aqueous alginate sol or an aqueous low-methoxy pectate sol and further includes the step of generating free gelling ions in the aqueous alginate sol or the aqueous low-methoxy pectate sol in the in-line dynamic mixer, is fed to livestock.

As stated above, it is a particularly advantageous aspect of the present invention that the sol does not need to be prepared in advance. The sol is produced in-line, i.e. continuously, in an in-line dynamic mixer.

As discussed above, Wood does not disclose, teach or suggest a process which includes a step of mixing water and a dispersion of alginate or low-methoxy pectate in an in-line dynamic mixer thereby producing an aqueous alginate sol or an aqueous low-methoxy pectate sol and further includes the step of generating free gelling ions in the aqueous alginate sol or the aqueous low-methoxy pectate sol in the in-line dynamic mixer, as recited in claims 26, 40 and 43-47. Wood does not disclose, teach or even suggest, in Examples 1-3 or elsewhere, the production of sol in an in-line dynamic mixer.

Dugger *et al.* also does not disclose, teach or suggest such a process which includes a step of mixing water and a dispersion of alginate or low-methoxy pectate in an in-line dynamic mixer thereby producing an aqueous alginate sol or an aqueous low-methoxy pectate sol and further includes the step of generating free gelling ions in the aqueous alginate sol or the aqueous

low-methoxy pectate sol in the in-line dynamic mixer, as recited in claims 26, 40 and 43-47.

Like Wood and Dugger *et al.*, Mann also does not disclose, teach or suggest a process which includes a step of mixing water and a dispersion of alginate or low-methoxy pectate in an in-line dynamic mixer thereby producing an aqueous alginate sol or an aqueous low-methoxy pectate sol and further includes the step of generating free gelling ions in the aqueous alginate sol or the aqueous low-methoxy pectate sol in the in-line dynamic mixer, as recited in claims 26, 40 and 43-47.

None of Wood, Dugger *et al.* or Mann disclose, teach or even suggest an important feature of the present invention, namely that the production of the sol and the generation of the free gelling ions occur in the same in-line dynamic mixer. Dugger *et al.* and Mann fail to supply the substantial deficiencies apparent in the teachings of Wood with regard to the present claims. Therefore, the combination of Wood, Dugger *et al.* and Mann does not render the present invention obvious.

In view of the above, applicant submits that the present claims, for example, claims 40 and 43, are unobvious from and patentable over Wood, Dugger *et al.* and Mann under 35 USC 103(a). Applicant further submits that claims 44 and 45 are patentable over Wood, Dugger *et al.* and Mann under 35 USC 103(a) at least by virtue of their dependence on claim 43 and that claims 46 and 47 are patentable over Wood, Dugger *et al.* and Mann under 35 USC 103(a) for the same reasons *mutatis mutandis* as claim 43.

CONCLUSION

In conclusion, applicant has shown that the present claims are novel over the prior art under 35 U.S.C. 102(b) and are unobvious from and patentable over the prior art under 35 U.S.C. 103(a). Therefore, applicant submits that the present claims, that is claims 26-49, are allowable and respectfully requests the Examiner to pass the above-identified application to issuance at an early date. Should any matters remain unresolved, the Examiner is requested to call applicant's attorney at the telephone number given below.

Respectfully submitted,

Date: 7/29/08

Frank J. Uxa
Attorney for Applicant
Registration No. 25,612
4 Venture, Suite 300
Irvine, California 92618
(949) 450-1750
(949) 450-1764 Facsimile